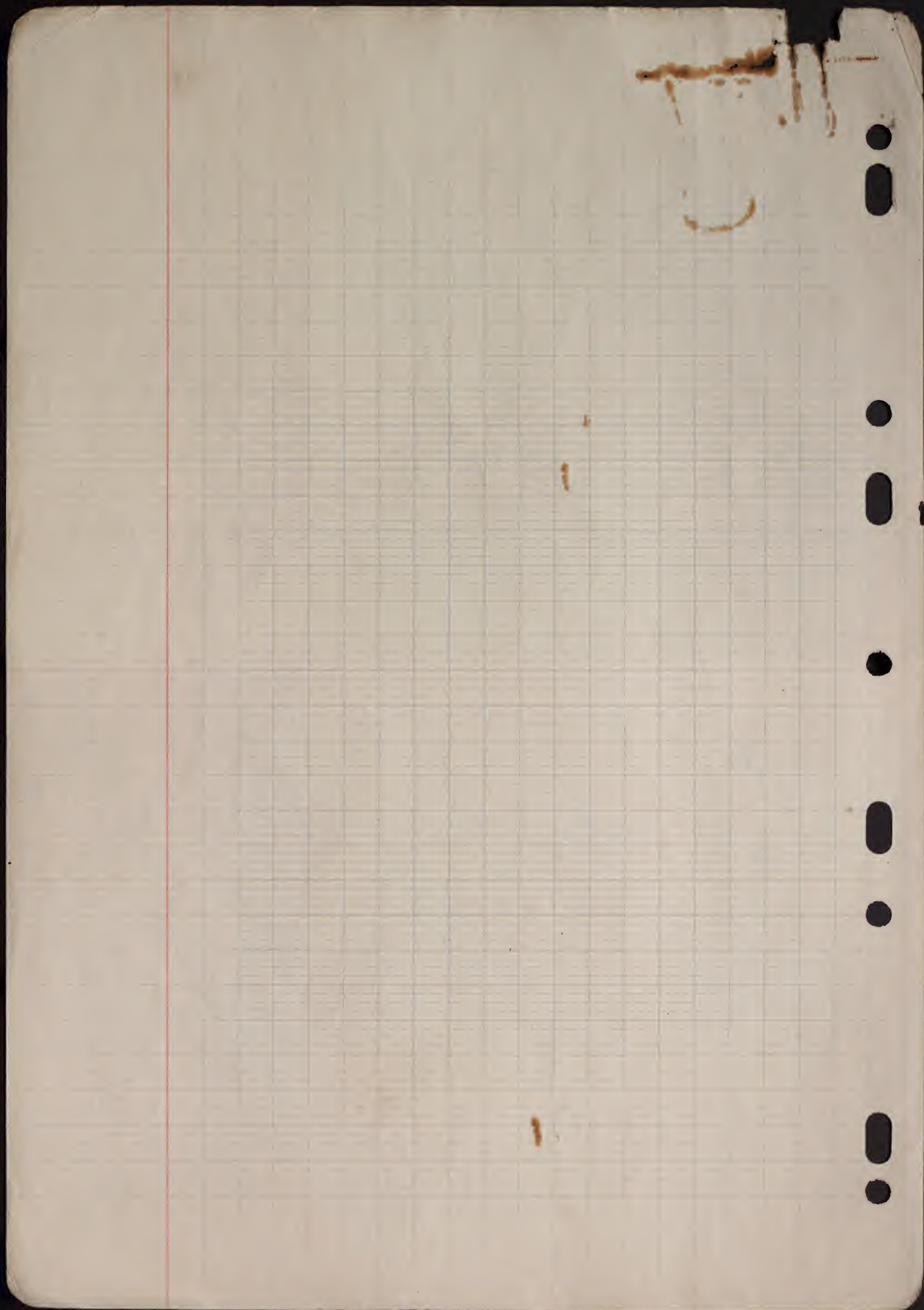


1938

KINGFISHERS



(2)

HALCYON SENEGALENSIS - Summary + Index - Oct. 7, 1976

Bert account pp. 112-122 (X pair at Magnis).

A common and successful species. Most characteristic of semi-open country. Primarily a hunter. Taking food from ground (especially? peanut fields) by swoops from perches (113 et seq). Perches 8-20 ft above ground. Prey is diverse: frog (early), large black insect, probably beetle (113), large, fat, non-hairy caterpillar (114), small non-hairy CCM (114), undistinguished CCM (121), undistinguished adult insect with legs (115), presumed grasshopper (116).

Possibly also takes small insects by flycatching (117).

Certainly feeds in or around extensive ricefields (140) on presumably relatively rare occasions. Possibly taking fishes or another animals from the water, but this has not been definitely established yet.

Not gregarious. In pairs or (more frequently?) singles.

Bluebelly occurs in the same habitats and seems to have similar feeding habits, but does not usually overlap at any given point at the same times (in the Casamance). Mal seems to prefer thicker vegetation and does not usually overlap (anywhere?). Pied is primarily a fisher, and does not usually overlap. But I think that inds. of any one of these three species may approach, or even briefly trespass upon, Sen territories or ranges in special circumstances or (in some cases) intermediate habitats.

The Bluebelly avoidance is the most remarkable.

The Pygmy is primarily a fisher and does not usually overlap. In any case, it probably is too small to be relevant to the Sen.

The Sen apparently ignores and is ignored by Redbills and Blackbills on Cap Vert where overlaps are complete (e.g. 10, 23). One pair of Sens paid no attention to a hole being excavated by Redbills.

Some or all of these kingfishers have been breeding during my periods of observation. Possible courtship on Cap Vert in middle of August. Feeding of young in nest, and probably also courtship (song) in the Casamance in latest September and earliest October.

Nest is a hole in a branch of a tree (one example). Young are fed by both parents (perhaps more often by ♂?). 114 et seq.

Nesting territory is defended. Territorial dispute (120).

Species is moderately noisy. But the vocal repertoire is composed of very few elements. Supplemented by a couple of rhythms and arrangements.

① Monosyllabic or "Tset" Notes. Apparently always single and used only as Intro to song phrases (119, 120). See also below.

② Chatter. Presumably the homologue and partial equivalent of the Twitter of the Pied Kingfisher. Series of more or less harsh, sometimes "squawking" notes. Considerable irregularity (113); but usually, I think, 3-4 notes per series (115). Uttered in a variety of circumstances: flying down to catch prey (113); coping with prey on ground (115); flying up after catching prey (114, 116); with unsuccessful prey capture attempt (121). (Note: much of the prey of the species must be difficult, perhaps intimidating. Capture is usually followed by much BU and pounding.) Also anti-predator reaction (113); at nadir (climax) of sweep at hawk (114). Also mounting, nest, mate nearby (117). Probably contains more escape and less attack than "simple" Rattles (115). Probably sometimes lower intensity than any single aggressive Rattle (115).

③ Rattles. Quite hard, loud, and mechanical sounding. Perhaps nothing more, in physical form, than accelerated series of many abbreviated versions of the same notes otherwise expressed as "Tset"s and chatter Notes ??? Often incorporated into, or associated with, two complex sequences or ceremonies: "Song", and "Greeting". This makes it necessary to consider 3 "versions" of Rattles.

"Simple" Rattles. Unmistakable examples: by an individual attacking a hawk, before Chatter at climax (114); by pursuer, chasing another individual of its own species (116); used to repel singing intruder? (120). Such performances presumably are more aggressive than all (?) Chatters. They must at least contain relatively less escape (115). Also probably higher intensity than some Chatters (115).

Rattles are also used in Greetings. The vocalizations in these

circumstances, seem to sound the same as the "simple" Rattles. They are distinguished by being accompanied by Wingspreads. Frequently performed by one individual (most often the ♂?) re-joining mate. Many probable examples (early). Definite examples (117, 121). Rattle + Wingspread by individual as its mate flies by (119). Similar performance by (same?) individual landing after attacking hawk, possibly in presence of mate (114).

General comment Greeting (117). Can be "one-sided", by only one member of pair (117).

Songs are composed of one Intro ("Isset") Note followed by a Rattle (again probably indistinguishable in form, per se, from "simple" version). Descriptions (119, 120, 121, 122); at dawn (134); by an intruder trespassing on X territory? (119 et seq.); by X (♂?) attempting to prevent trespass in advance? (122). As a whole, the performance is roughly or generally homologous with the song of Mal.

Note. I heard a lot of Rattles by fens at Cap Vert during my first days of field work (e.g. 4, 15, 35). At that time, I was not aware of the differences among "simple" Rattles, Greetings, and Songs. In retrospect, I imagine that most of the "dawn chorus" patterns heard were songs, with a substantial minority of Greetings but perhaps not many simple aggressive versions.

Comment. Songs seem to be characteristic of Halcyon spp.

The most conspicuous non-vocal pattern is Wingspreading. Can be silent (114) or with (simple) Rattles. Used as landing and/or Greeting display. Probably the same in form, per se, in both sets of circumstances.

Performed silently by birds landing alone (114, 119, 120, 121). But not all landing is accompanied by Wingspread (116). I have also seen a bird do a silent Wingspread when it crow flies off (120).

All the Wingspreads with Rattles that I have observed so far have been Greetings or something very similar. Usually when one bird lands beside another, or perhaps when two land together (early, 117, 121). Once performed by a perched bird when its mate flies by (119).

Note: it is also possible (conceivable) that silent Wingspreads

h
can occur as (low intensity) Greetings. But my notes are obscure on the subject. No definite examples recorded as such.

I am not sure of the usual orientation of Greeting Wingspreads. It was my impression that they may be given with back toward partner (i.e. the reverse of what seems to be usual orientation of homologous display of Mal); but I might well be mistaken.

Flight int. movs. are not common or frequent (113, 119). Such as they are, they include Headbobs, one or two at a time (113, 114, 119), and Tail-glides, usually or always down-up (113, 114).

I have seen wingflutters after Wingspreads, but they did not seem to be ritualized (115).

(1)

HALCYON MALIMBICUS - Summary + Index - Oct. 14, 1976.

Best (or better) accounts pp. 124-128, 146-151.

Still another common and successful species. Characteristic of denser and often taller vegetation than Sen (e.g. 117). Rather lush forest and scrub, with little or no open ground. Tall mangoes by villages. Not seen to use peanut fields, even when available. Also visits mangrove, even bushes (138, 142, 143 et seq.).

The species is presumably primarily a chasseur rather than a picheur. But I must, so far, assume this on faith. I have seen Mals fed on very, very infrequently (comment, 171). And the few cases that I have seen have been connected, directly or indirectly, with water. One ind. seen to plunge (unsuccessfully?) into water of a village cattle pond (103). Same ind. seen with presumed dragonfly in bill (103). Another ind. seen to land on mud edge mangrove swamp, and apparently to pick at or probe into ground (144).

The species certainly is not gregarious.

Territories seem to be large in some areas (148). Smaller, perhaps no more than 500 yds across, in unusually favorable (village) habitats in which inds. are concentrated (147). Territories certainly are defended.

Defended actually against other inds. of the same species (127 - best description of an overt dispute).

Relations with Sens seem to be difficult, not friendly. Sen territories or ranges approach, perhaps even overlap (temporarily?) those of Mals (126, 147-148 et seq.). I have seen a Mal monitor and evict Sens, perhaps even attack (147 et seq.). Mals seem to be dominant over Sens. The mere sight or sound of Mals may inhibit Sens (148). Sens may be forced to evacuate an otherwise suitable area by Mal activities (143).

Escorting behavior is reminiscent of Blue bellies and perhaps hornbills (143).

Mal territories overlap those of Blue bellies (e.g. 124 et seq.) and Lilacs (Oct. 14), and are at least adjacent to those of Pygmy Kingfishers.

(103, 135) and Giant Kingfishers (136). I have not seen any reactions to these species.

The Mals can, however, be aggressive toward other forms. I have seen attacks on a Streptopelia Dove (147) and a small, unidentified, long-tailed warbler (150), and display with Wingspread at a coucal (149). Some or all of these incidents may have been redirection, causally related to host or encounter with sex.

Redirection is common among Coraciiformes.

I do not have good data on the cycle of Mal. The local birds may be in (or coming into) breeding condition now. Possible pre-copulatory behavior in early October (126-128 - see also below). Songs from (at least) Sept. 11 onward. Aerial displays from (at least) early October onward.

The species is messy. Many homologues with sex, but the general or superficial effect is quite different. Each species has specialized in different patterns. They might be said to have "divided" the basic repertoire of the group (151).

① The most common, and actually very frequent, vocal performance is Song. Can be aerial or non-aerial. Typically consists of an Intro Note followed by a series of rather melodious Whistles. Many descriptions of more or less typical songs by perched birds (77, 78, 80, 99, 118, 123, 124, 126, 127, 128, 133, 134, 135, 136, 137, 138, 141, 142, 143, 147, 148, 170, 171, 172, 173). Sketches of singing postures in separate book. These postures are not usually very ritualized. Head and bill sometimes pointed diagonally upward.

It is usual for song phrases to be repeated. Some series of phrases are very long. Intervals between phrases may be no more than a few seconds. See, for instance, p. 118.

Aerial displays are fairly complex. A single bird (♂?) flies around, usually high above ground (up to 500 ft or more?) in rough circles or figures of-eight patterns, with normal fast wingbeats, always (without exception in my experience) uttering song phrase after phrase. Then plunges back to earth in a spectacular dive. Descriptions (123, 128, 146). Classical example (147). Highest example (148).

I have never been able to see what provokes an aerial display.

or what follows immediately afterwards.

Even when songs are not aerial, they are often given from high perches (1417). Doubtless functional in context (see below).

When songs are uttered one right after the other, there is a "usual" sequence of changes between successive phrases. First phrases are short. Later phrases become progressively longer (usual maximum may be 4-5 Whistles - sometimes extending to 7 or 8). Good example (146). The most regular of sequences would be: Intro Note alone - Intro Note + 1 Whistle - Intro Note + 2 Whistles - Intro Note + 3 Whistles - Intro Note + 4 Whistles..... This sort of progression is common, probably really usual, in aerial displays. It is less common but not rare when songs are uttered by a perched bird.

An Intro Note might be transcribed as "Tset". I do not think that I have ever heard such notes uttered by Mals apart from songs (or song contexts).

- (2) The combination of an Intro Note with 1 Whistle is a sort of doublet "Tset-whicoo". Perhaps a Binyllabic Note? Descriptions, in aerial display (124 and other refs. above), and during non-aerial songs (124, 133, 143, 171, 172).

Successive Whistles of a single song phrase usually become progressively shorter. Often also lower in pitch? Last note usually definitely low and abbreviated. Bouncing ball effect (142, 143).

The equivalence or homologue of the Mal Whistle is difficult to determine. At least in kingfisher repertoires. This Whistle could, I suppose, be a modified partial version of a "basic note" (the Intro being another version?) And/or another kind of Binyllabic Note???

The songs of one ind. often coincide, overlap or alternate, with those of (an) other(s). When all inds. are perched (e.g. 717, 78, 142, 143). When one ind. is flying in aerial display (126, 146, 147). Alternate "counter singing" can be almost perfect (174).

There are possible variations in form. The most interesting or problematical involve "Rattle", "semi-Rattle", or "pseudo-Rattle" components.

(C)

Sometimes several Intro Notes are uttered together, before usual series of Whistles. Examples (103, 137, 171, 172, 173, 174). Sometimes a single Intro is followed by a more or less brief "rattle", a series of short hard notes, before usual Whistles. Examples (143, 144, 146, 147, 148, 171, 172, 173, 174). These two variations are closely related, hardly to be distinguished in fact. All the short hard notes, Intros and rattle-includes, are very similar in sound. Which one(s) is (are) called Intro(s) may be largely a matter of emphasis, loudness. See discussions (171, 173, 174).

(Also) closely related are a group of variations that might be summarized as Intro-Whistles-Rattle-Whistles (144, 148). Sequences of this type probably are 2 phrases "telescoped" together.

I do not understand the causal or functional distinctions between rattle-in and non-rattling songs. All or most songs seem to be "advertising". Perhaps only long distance signals. The one actual intraspecific attack observed was silent (127). The songs uttered in possible association with hostility toward a hen (148 et seq.) were not rattle-in (or not particularly so). But it is obvious that some sort of short term temporal and/or intensity factor is involved. The first dawn songs do not usually include rattle-in components (146, 147). Nor do aerial songs. But rattle-in components tend to become relatively more frequent, in non-aerial songs, as a morning wears on, as birds seem to be "running down" (148). Why should this be so? Are the Rattle-in components of this species merely shorthand abbreviations? If so, are the "full" Whistles of the species homologous with single Rattle notes of other kingfishers ??? And/or with the Whistles of hornbills ???

Other relatively rare and minor variations are the apparent absence of any Intro Notes (91), and sequences of Whistles that become progressively longer rather than shorter (143).

Singing, like most other activities, seems to be discouraged by cold (135).

④^{or} ??? One Mal (♂?) was heard to utter something like a rasp or harsh chatter, in apparent association with dispute with hen (149)
⑤

Halcyon malimbicus (cont'd 2).

(11)

The most conspicuous visual display is Wingspreading. It seems to be rarer in this species than in senegalensis. Usually or always as Greeting. During presumed σ^7 - q interactions (127, 128). Sometimes on landing beside partner. At other times just sitting beside partner. Not always mutual. Apparently always, as Greeting, with song. Usually, I think, short and soft phrases. Orientation is toward partner. Flashing "eyespot" (sketch, 127)

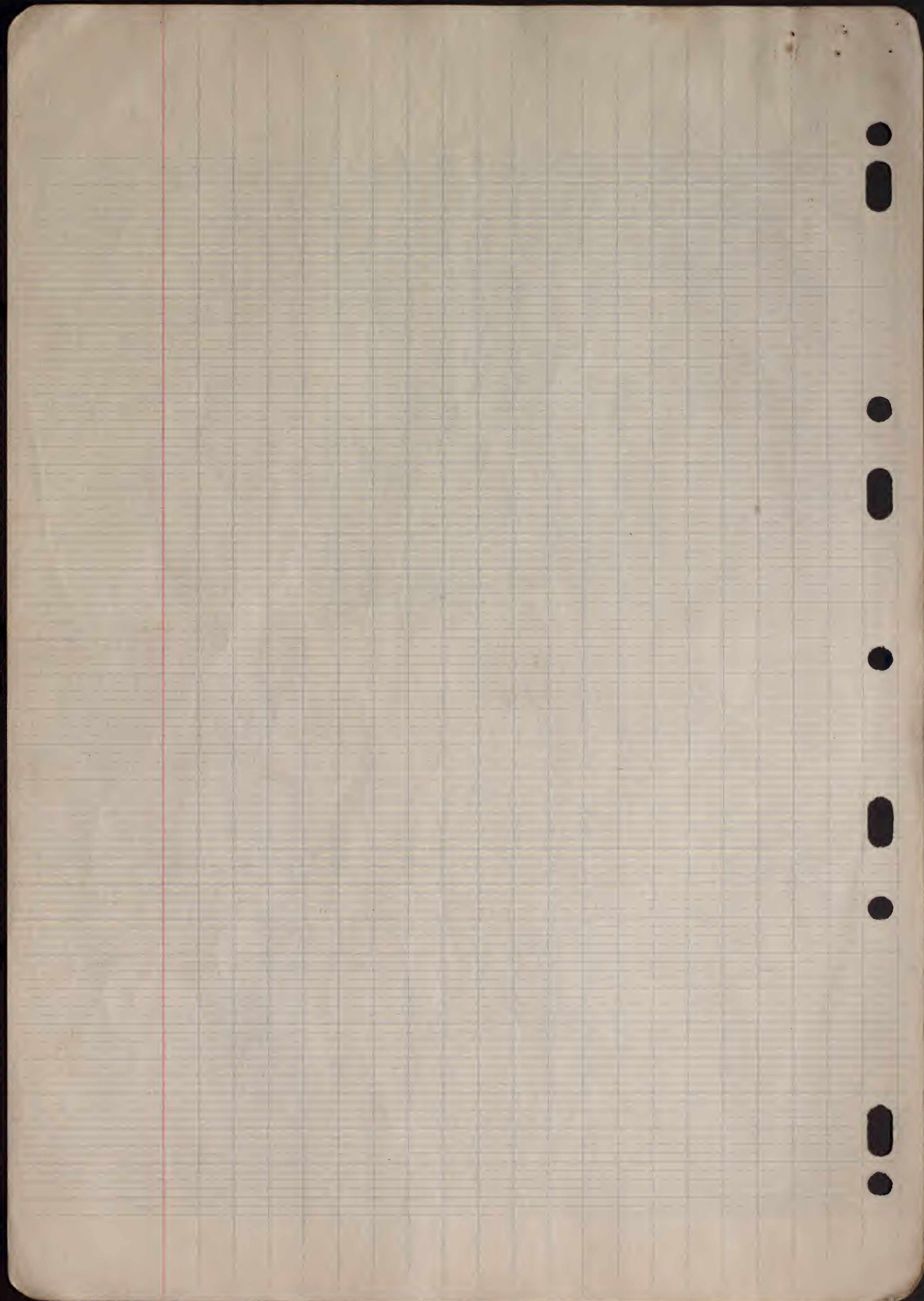
One Mal was seen to Wingspread to a conceal (149). Circumstances obscure. Possibly redirection or misdirection vis à vis Sen ??? I could not tell if this performance was accompanied by song or not.

The single overt attack seen, silent chasing during intraspecific territorial dispute, is described on p. 127.

Presumably sexual, σ^7 - q , interactions (the "Bright" and "dull" inds.) are described on p. 126 et seq. Among the patterns seen were Greetings, an apparently hostile scuffle, and Belly-fluffing. Possible "precopulatory" patterns were hopping from perch to perch, like hornbills.

Belly-fluffing was only seen (noticed) once. In presumably sexual situation. By less enthusiastic or more alarmed of the 2 partners. See p. 128 and sketch in separate book.

Flight vit. movs. are not common or frequent. Such as they are, they include Head bobs (142) and, I think, down-up Tail flicks (I can't find reference in notes, but my memory is probably reliable).



MEGACERYLE MAXIMA — Summary & Rough Index — Dec. 2, 1976

Best accounts (243-288, 293-301, 308, 314, 331-339). General comment (284-285).

The species has been seen only in the Casamance, and only south of the river itself. In this region, it is much less common than the Red Kingfisher or Halcyon senegalensis or H. malimbicus (or most of the rollers or the Yellowbills); but it is not actually rare. Perhaps surprisingly abundant for such a large predator (338). It occurs in a wide variety of habitats. Perhaps the same as the Red and Pygmy? (336). I have found representatives of the species beside small and medium, probably brackish or fresh water, ponds (103, 181, 243, et seq.), in and around mangrove swamps (? 103, 237), and (once) by fish ponds and rice fields (335). Individuals often fly over dry land, far from water, perhaps especially in the early mornings (136, 200, 219-220).

As far as I can tell, the species is purely a piscivore. I have never seen an individual actually catch prey. I have, however, seen diagonal "sweeps" over water that looked like fishing attempts. Never hovering. All preys seen (in sexual situations only) were rather large (several inches long) fishes.

All individuals seen have been singles, especially (coincidentally?) females (103, 181), and pairs (243 et seq. ad inf). I am certain that pairs are the basic unit throughout most of the year. I have not seen young out of the nest yet. General comment (284).

The species is straight and straight-arrow.

Each pair seems to have a large home range or territory. Too large for me to have been able to estimate. Territorial defense does seem to occur. Aerial chase with Yelps, Rattles, and Raps (337). Possibly also silent chases (305).

There may be special roosting sites, in or (?) out of territories (220, 286).

Interspecific relations can be complex. Comment (288).

(9)

At times, Giants seem to ignore hornbills and even rollers (278). Perhaps this is not typical of interspecific relations in general. Certainly there is at least a fair amount of the usual Coraciiform watching and monitoring. Giants may be monitored by Puffins and Puffins (104). They may even Yelp and Rattle at Puffins (278). They may be wary of Bycanistes fistulator (287). They can also be wary of Abyssinians (294), perhaps with more reason. I have seen (and) Abyssinian(s) attack a ♀ Giant (284, 288). Reaching a *modus vivendi* a day or two later (300).

Relations with Pied Kingfishers are much more overt, or frequently hostile. Of course, the two species overlap extensively. Surprisingly enough, it is usually, or always the Peds that are the aggressors. Peds may monitor Giants (404). They often actually attack Giants. Frequently when there is apparent competition for nesting sites (273, 274, 275, 276, 287, 300, 301, 339). Perhaps also in other circumstances (344). Peds may even be able to "take over" nesting sites previously chosen, and excavated, by Giants (300, 301).

I have good data on the rather simple sexual behavior of one pair of Giants near Mambalang.

Ten copulation attempts, all in early mornings, seen over a period of 16 days (Nov. 16 - Dec. 1). Four attempts possibly successful (281, 294, 308, 331). Six attempts probably unsuccessful (287, 295, 298, 314, 332, 344-345). This is not a very good ratio! General form of attempts is typically Coraciiform. Usually with some preliminary vocalizations (287 etc., see also below). Sometimes without (281). General comment (285, 287).

♂ and ♀ "keep in touch" with one another, even apart from copulations, by Yelps and Rattles (349). They may even "stare" on occasion, one ind. Yelping, the other answering with Rattles (342).

Sexual displays include Raps and feeding of the ♀ by the ♂. See below.

I have also observed nesting behavior, by the same pair.

Megascops maxima (cont'd)

(P)

Preparation and excavation of hole. Site in bank, riddled with old "fossil" holes, description etc. (273 et seq). ♂ takes initiative, both in "showing" (274 et seq., 281 et seq., 283), and in actual digging (e.g. 279). ♀ eventually becomes more active than the ♂ (283). In the case of this particular pair, preparation of the hole appeared to stop after some days (295, 301). Perhaps "natural." Perhaps due to interference, by me or by Peds (and Alupinnians?). Perhaps the site simply was changed (309).

The display repertoire of the species is comparatively simple (284). Largely due to the simplicity of the vocalizations. Two main categories: Yelps and Rattles.

① Yelps. The "Basic Note" (276). Descriptions (136, 219-220, 274, 275, 276, 278, 279, 281, 282, 283, 284, 286, 287, 289, 294, 295, 298, 301, 305, 308, 314, 315, 316, 318, 324, 331, 332, 334, 337, 338, 339, 342, 344, 345, 349).

Yelps are variable in form. Some are very loud; others are more or less soft. The extremes of loudness and softness seem to intergrade smoothly or almost perfectly. A few Yelps are single. The majority are uttered in irregular series. Others are organized into stereotyped Doublets, Triplets, or Quadruplets. These may or may not intergrade with the more usual irregular performances.

Many or all Yelps may be at least partly hostile (284). Perhaps often also partly friendly and/or sexual.

Loud Yelps may be nothing more than high intensity or "long distance" soft Yelps.

Loud Yelps certainly are uttered in a great variety of circumstances. They are often heard in flight. With aerial "series" or "pseudo" display (200), aerial chasing (337). Often uttered by inds. landing alone (e.g. 337) or flying in from a distance to (or) join mate (e.g. 298). Also by birds, presumably alarmed or worried, generally "tense", visiting nest holes (e.g. 278, 279, 282). Sometimes closely associated with Tail-bobs (278). Often (perhaps usually?) uttered by one or both birds flying away after a copulation attempt (281, 287, 294, 295, 298, 345).

Yelps can be uttered by themselves alone or in association with Rattles SEE BELOW. It is my definite impression that loud Yelps are relatively more frequently associated with Rattles than are soft Yelps.

Soft Yelps also are uttered in a great variety of circumstances. They often appear to be "flight intention" sounds (275, 278, 279, 281, 282, 283, 284, 332, 345) Or even "alarm" (275, 282, 284). They can also be uttered by both inds. before cop (278), by one or both members of a pair when joining one another (279), and as "contact notes" (calling back and forth) between members of a pair (282, 284, 314).

It is the soft Yelps that are most likely to be organized into Doublets, Triplets, and Quadruplets (275, 278, 282). Possibly these series are heterogeneous in motivation and functions.

Doublets are reminiscent of the Bilingual Notes of other species in form (282). They are sometimes (usually?) uttered by a (the) ♀ before copulation (287, 294). Perhaps actually "soliciting" ???

I have heard Yelps accelerated to a "chatter" in "semi" or "pseudo" aerial display (318).

② Rattles. Descriptions (136, 219-220, 274, 275, 281, 282, 283, 284, 286, 287, 294, 298, 305, 308, 314, 315, 316, 324, 331, 334, 338, 339, 342, 344, 345, 349) Relatively invariable. Very different from Yelp(s) in form, but apparently less distinct in other respects than might have been expected. Perhaps higher intensity and/or more aggressive and/or more (nearly) purely hostile than even loud Yelps on the average - but probably not very much so. Perhaps always in association with Yelps, never alone? Can occur after copulation attempt (294), during aerial chase (337), when one ind. of a mated pair joins the other (e.g. 281, 298, 349).

Combinations of Yelps and Rattles are not absolutely stereotyped (276). Neither are they completely random. Rattle-Yelp sequences occur (275, 278, 281). But they probably are not typical. Rattles at the beginning of a "rally" seem to be unusual (313). More common are sequences of Yelp(s) - Rattle (276, 278, 287, 306, ? 342, 344), and of Yelp(s) - Rattle - Yelp(s) (281, 283, 287, 294, 333).

(7)

Megaceryle maxima (Cont'd 2)

Possibly the two patterns can be combined as "duets," one ind. Yelping, the other Rattling (342).

(3) The only other distinctive vocalizations heard are Raps. These would seem to be (Food) Begging. Usually or always by ♀. Descriptions (332, 333, 334, 338). With Crown-smoothing (334) Comment (335). Associated with copulation? (333). With aerial chase (339).

Feeding of the ♀ by the ♂ must be "sexual"; but it does not seem to be directly or closely linked either to copulations (see above) or nesting, at least preparation or excavation of the nest (335, 338). Two full sequences are described in my notes. In one case, the ♂ was reluctant (333-334). In the other case, the ♂ was less reluctant (338-339). Raps by ♀ may be an integral part of the mutual performance (332, 338). I have also seen a ♂ carrying a fish without further interaction (295).

The species has a very large number of visual signals. On the whole, they are not very complex.

Perhaps the commonest is CR. Ranges (smoothly?) from very slight to extreme. Many (not always very clear) references in my notes (103, 136, 274, 275, 276, 281, 282, 286, 287, 289, 293, 294, 295, 297, 298, 301, 305, 308, 314, 315, 324, 343, 344). The pattern obviously varies in intensity. Can occur in a wide variety of circumstances, as a refinement, addition, or spice to many other patterns. Silent (e.g. 274, 275, 332, 333, 343, 344). Or with vocalizations.

Examples of combinations and circumstances. Extreme CR as sign of alarm (287), while regarding Bycanistes fistulator (289); while regarding Abyssinian (294); by ♀ landing beside ♂ (298); by ♀ next to ♂ (314, 344); by ♂ next to ♀ (315, 332, 333, 345); by ♂ feeding ♀ (333, 338); by ♂ and ♀ landing together (300). CR's of one sort or another with soft Yelps (315); with Yelps and Rattles (136, ? 286); with vocalizations and Wingspread (286); with Gape and Wingspread (274, 275).

CR's may, in fact, be combined with all (non-flying) hostile patterns except, possibly, extreme alarm or appearance.

5

In extreme alarm or apprehension, CR's may be replaced or contradicted, by positive Crown-smoothing. Examples. By ♂, with ♀, showing hole or excavating (275, 281, 282). By ♀, with ♂, at nesting hole (281). By ♂ carrying fish (275). By Rasping ♀ (332, 333). By ♀ being led by ♂, without Rasps (338).

The species has a ritualized Wingspread. In a restricted set of circumstances. Apparently only in reaction to attacks by other species. By Reds (273, 274, 275, 276, 287, 300). By Allynianians (282, 286). Sometimes silent (282). Sometimes with vocalizations, Yelps and Rattles (276, 286). With CR and vocalizations (286). With CR and Gape (e.g. 274, 275). Apparently never performed by mates joining one another (283).

Gaping also seems to be ritualized in this species. As reaction to attacks by Reds, with CR and Wingspread (273, 274, 275, 300).

Some flight int. movs. are usually (but not always - 103) common.

The most characteristic is V-D Tailbobbing (274, 276, 278, 282, 283, 286, 294, 295, 297, 298, 301, 305, 306, 337, 338, 344, 345). With Yelps (278, 287, 306, 344). With Rattle? (306, 344). With CR (e.g. 344, 345).

Tailbobbing has been seen to be accompanied by wingflutters (337).

Shaking has not been seen (287).

Headbobbing occurs but is relatively rare, much rarer than Tailbobbing (276, 283).

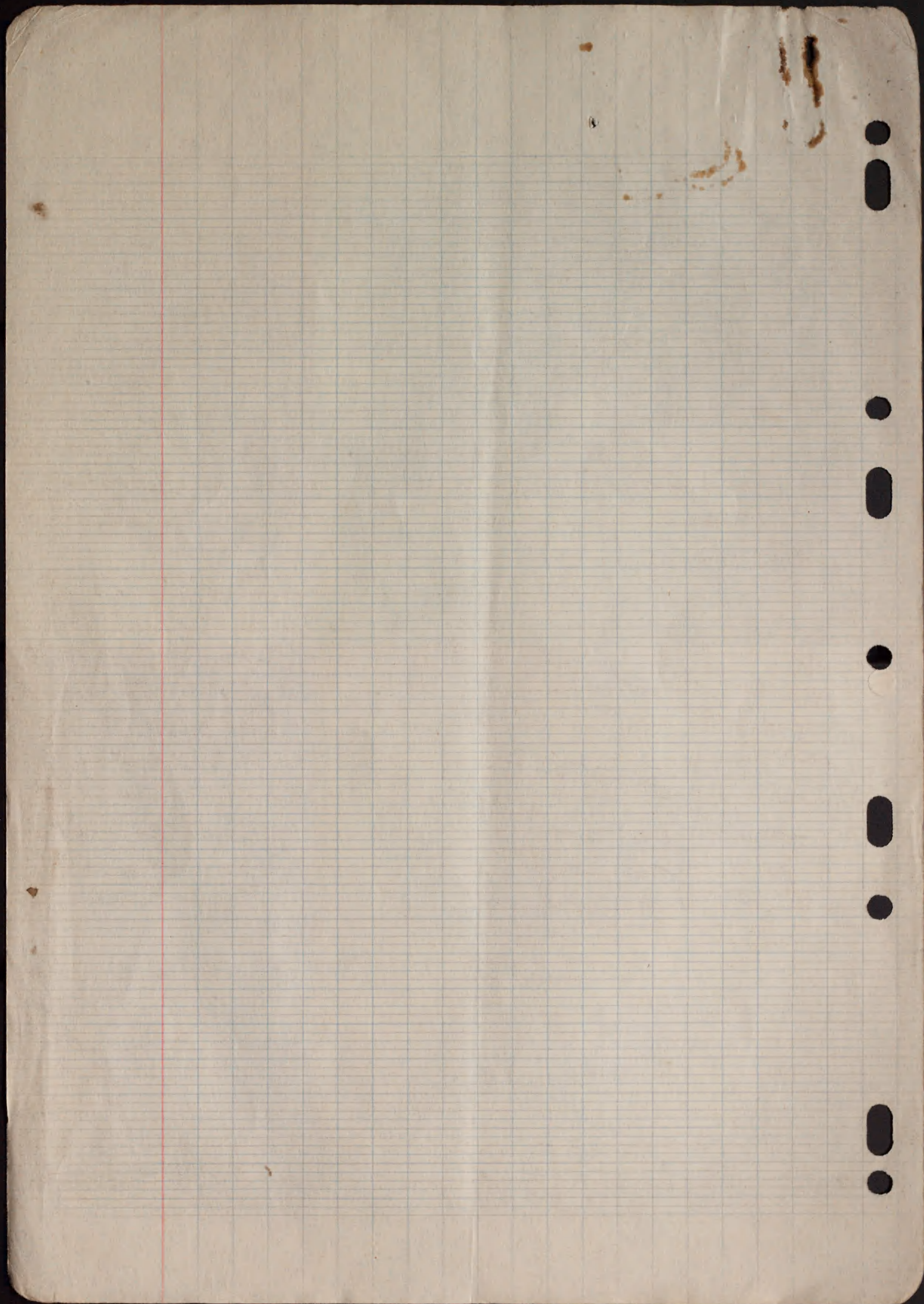
Pre-flight postures may be F-like. E.g. by ♀ before following ♂ (345).

Some preening looks like "displacement". In preoccupation situation, certainly by ♂, possibly by ♀ (345).

Perhaps the most distinctive aspects of the social behavior of the species are negative Absences. The species seems to lack both special "Greeting" and special "Song" performances (284)

Aerial chases occur occasionally. They can be simple and silent (305). Or they may be more elaborate. Bonnerman or (more probably) Maskworth-Powell refers to an aerial display. The term may not apply. I have observed high circling with Yelps (200). And with Chatter-like Yelps and a descending glide (318). But I am not sure that such performances are really stereotyped.

WOOD-HOOPES



①

PHOENICULUS PURPUREUS - Summary & Index - Nov. 6, 1976

Accounts are all bits and pieces, but see especially pp. 151-153, 169-170, 177-179, 241-246.

A very common and successful species in the Base Casamance (many refs). Probably also on Cap Vert (40, 45, 56). Perhaps less so on the Petit Cote? Probably prefers semi-humid environments or irrigated (cultivated) patches in drier areas. Frequently seen in and around *R. palms* (many examples). Occurs in towns (Ziguinchor, 60) and in rather artificial gardens (Cap Skirring, 151-153). Has been seen in savannah habitat (166), on beaches (169), and near Marigots (176). Once even flying over mangrove swamp (perhaps lost?).

The feeding habits of the species are unusual for a *Coraciiform*. Inds. are in nearly constant motion, actively going in search of food. They do not wait for food to come to them (or come to their attention). See, for instance, pp. 163, 181. The species is primarily a "scrambler" and a prober, into holes and crevices of trunks and branches, like a tree creeper or wood creeper (40, 76, 104, 117, 177, 241, 242, 243 et seq.). It also probes into the debris at the centers of *R. palm* crowns (152); and gleans the fronds of the same trees (152 again). Doubtless it is primarily insectivorous or arthropodivorous. Prey usually too small to be seen by a human observer (an apparent exception, an insect, p. 245). But inds. also take (presumably ripe) *R. palm* fruits (57, 243). Peeking into the fruits rather than swallowing them whole.

The active search for food may help to explain the most peculiar feature of the social behavior of the species, i.e. its extreme (intraspecific) gregariousness (comments, 146, 180). Most of the other species of *Coraciiformes* that are more or less gregarious, e.g. some hornbills and bee-eaters, also are active searchers or hunters, rather than patient "waiters" or "pouncers". But doubtless the story is not simple. Gregariousness may (also) be an anti-predator device (146). Woodhoopoes and bee-eaters are both comparatively small and perhaps therefore vulnerable to predation.

It should be noted, however, that Phoeniculus purpureus is not particularly shy (although it does react noticeably, audibly, to some birds of prey — see account of birds at Cap Skirring).

The sizes of the groups seen were as follows: 2, 4, 6-7, ?, 6, 16, ?, 1 (mangrove), 3, 3, 3-4, 5, ?, 12-15, 2, 1, 2, 2, 7, 3, 5, 1, ?, 5, 6, 4-8, 4, 2, 3.

Territories or ranges of inds. and groups seem to be relatively very large (92, 163) so large that inds. are difficult to find or "predict" (163).

I am not sure that I have ever seen territorial defense; but there are certainly vigorous disputes among inds. (best example, 169-170).

I have almost no information on seasonal or annual cycles. A pair may have been (coming into) breeding condition on Oct. 10 (152, 153). Other inds did not seem to be breeding on Nov. 5 (238). Juveniles were seen with adults on Nov. 6 (241, 243 et seq.) Possibly also on Oct. 15 (179). Group figures cited above may be relevant.

A possible (but dubious?) low-intensity copulation attempt is described on p. 152.

Relations with other species are various. Apparently simple in some cases. Purpurs seem to ignore, and to be ignored by, many relatives and some other species of the same environments, e.g. Redbills (45, 58), Blackbills (38), Yellowbills (245), Lilacs (98), Kingfishers (104), green turacos (81). The species is not, however, entirely detached or passive, much less subordinate. I have seen Purpurs supplant Arremonops and Turdoides-type babblers (242). They may also repel Psittacula parrots (180).

The really problematic relationship is with Bluebellies. The two species often prefer the same habitats. They may also associate and/or interact, amicably or in-amicably, more frequently than would be expected by chance alone. General discussion (245-246). Purpurs often occur near Bluebellies (e.g. 170, 176, 221, 243). They may even "check in" (later refs.). But they are also "off put" by, and/or are afraid of, Bluebellies. They may be (unusually) silent in the vicinity of the rollers (133). They may retreat before the rollers (177, 247). They may

Phoeniculus purpureus (Cont'd)

(3)

be attacked by the rollers (174-175).

The Purpur-Bluebelly relationship may be close enough to have entailed the evolution of social mimicry. Certainly the voice of the Purpur is remarkably Bluebelly-like (e.g. 118, 177).

The species does, in general, have more frequent or conspicuous ritualized patterns than some other Coraciiformes. Perhaps not surprising in view of its gregariousness?

The common vocal patterns include hoarse, nasal "Auk" Notes (presumably the Basic Note of the species) and Rattling Chatters (presumably composed of many, probably abbreviated, "Auk" Notes uttered in rapid succession). Both must be primarily hostile.

More or less typical "Auk" notes are described on many pages (e.g. 57, 63, 93, 104, 110, 176, 178, 180, 242). Sometimes accelerated into "semi-chatter" (242).

Typical Rattling Chatters (56-57, 63, 104, 110, 151-152, 153, 169-170, 176, 177, 178, 179, 241, 242). Always rapid (170). With Bowing (63, 151, 153, 176, 177, 241, 242). SEE ALSO GREETING. In O Posture, without Bowing (152). With "Gaping", without Bowing (170). With jabbing (152). By particularly aggressive individual (170). As an anti-predator reaction, without Bowing (179).

A slightly peculiar variant is a 3-4 note "squawk" in alarm (178).

I have also heard a "wooden" rattle in flight (242).

There more or less hoarse, harsh, and often nasal sounds are supplemented by higher and clearer patterns. Which may or may not be "variants".

I have heard hard "Peet" notes, possibly in alarm (57). There may also be clear "Auk"s (241). More common is Twittering. This sounds like a clear version of the Rattling Chatter (176, 177). Like the typical Chatter, it can be combined with Bowing as Greeting (180). It could, conceivably, be a juvenile form of Chattering (177). Or even (just) high intensity ???

The known visual displays are linked together in one "complex".

Rattling Chatters may include or emphasize Gaping (170). The inside of the mouth is conspicuously bright red.

Typical Chattering may be delivered from a "simple" Oblique Posture (152). Perhaps also from a "simple" Low Oblique or Head-down? (37)

These patterns seem to be relatively rare, very unusual. Much more common and typical is Bowing. Essentially, alternating LD or HD with more or less Tailwhipping. Descriptions (83, 151-152, 153, 176, 177, 241, 242) Sketches (152, 241). Probably always combined with vocalizations. Usually Rattling Chatters (ref. above). At least occasionally, Twittering (180)

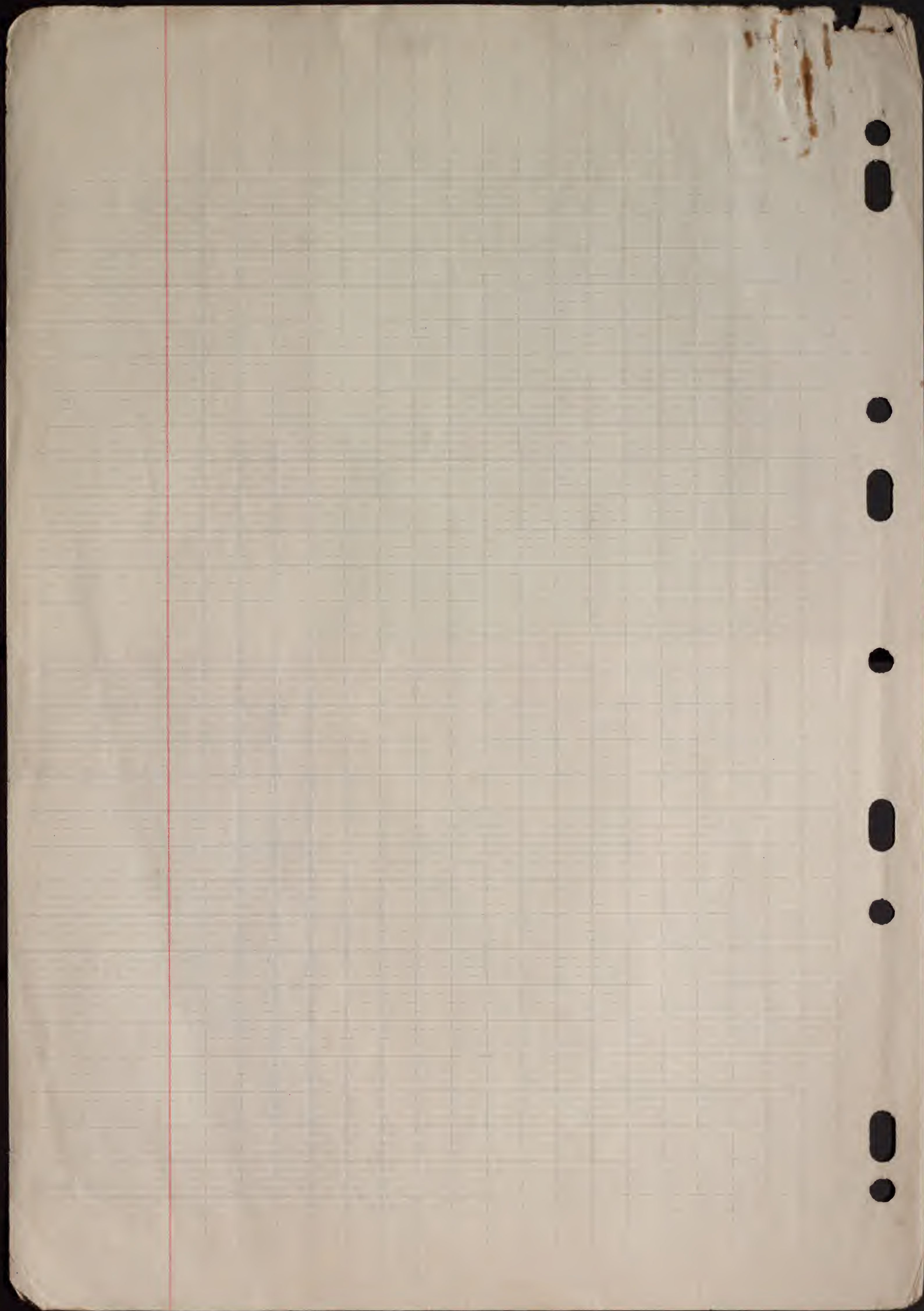
Bowing with vocalizations is usually or always Greeting. Greeting behavior is comparatively very well developed, frequent, (unavoidable?) in this species.

Song on the other hand, seems to be absent.

It would be nice to know if the arrangement is characteristic of Phoeniculidae in general. It might be expected to be correlated with extreme intraspecific gregariousness.

The most friendly pattern seen is Allogrooming. Certainly typical. Descriptions (152, 178). A preener may be preened, in turn, by another (Hurd) individual (179). Another correlate of gregariousness.

HORNBILLS



Redbill

Not very gregarious, but
sometimes with communal
display performances

"Whup" Notes.

Double Notes, apparently
always with Wing-raise
(perhaps trace Bill-down ???
and Bouncing ???)

Rattle

Mixed habitats; trees
interspersed with scrub,
crop fields, grass, and
bare ground.
Arborescent vegetation
predominant.

Usually feeds on ground.

"Nibbles" baobab leaves.
Catches (on ground) and
eats ccm's frequently.
Does only a little, and rather
inexpert, flycatching.

Blackbill

Not very gregarious, but
sometimes with communal
display performances

Single Whistles

Double Whistles (always or
almost always with both
Head-flides and Wing-flicks)

Trill

Begging Notes

Mixed habitats; trees
interspersed with scrub,
crop fields, grass, and
bare ground.
Open spaces predominant

Largely arboreal.

Eats Rorer palm nuts.
Feeds large insects to
mate and/or young.
Has been seen with ccm in
bill once.
Has been seen with large
black beetle in bill once.
Flycatches frequently and
expertly.

Both species seem to leave frogs to kingfishers
(Halcyon senegalensis).

Neither species seems to worry about the predators
that I have seen.

Territories or home ranges of the 2 species are broadly
overlapping. But there is little close contact between individ-
als of different species. It is also possible that nests are usually
apart.

There is considerable overlapping of "song" type
performances. Perhaps random, perhaps not. See comment p. 20.
In any case, Blackbill is much more vocal than the Redbill, on
the average, at least now.

It is interesting that the species of denser vegetation
(the Redbill) behaves more like a species of open country than does
the species of sparser vegetation (the Blackbill).

Does the smaller species (the Redbill) also behave as
if it were the larger form ???

Perhaps not. At least the Blackbill seems to be
dominant near its own nests.

SUMMARY - SEPT. 12, 1976

Yellowbill

Not usually gregarious; no communal displays. But probably (?) roosting in groups. Perhaps also feeding in groups (8-10 individuals) occasionally.

Single Whistles. Rather variable. Perhaps purely hostile. Possibly distinct accelerated and abbreviated Whistles in flight and/or as flight intention movements.

Triplets. With Bouncing. Used to proclaim ownership of territory and/or (at least in case of ♂'s) to call in mate.

? Rattles? Perhaps sexual???

F is flight intention movement.

BW and/or Pr. may be ritualized displacement patterns.

Wing-spreading by ♂ is copulatory.

Submissive by ♀ is also copulatory.

A variety of habitat preferences. Near Djibouti, in mixed vegetation with many large dicot trees but no continuous canopy. Along road at edge of Parc, low dense scrub forest.

Almost exclusively arboreal. Often high in trees.

Usually feeds in trees. "Gleaning" from leaves of *Ficus* and *Jatropha*. Takes large winged insects, also ccm's. Once a lizard. Once seen to eat fruit (fig?).

Probably chases flying insects (incl. blue *Papilio*) occasionally. But no real flycatching (i.e. no aerial sallies).



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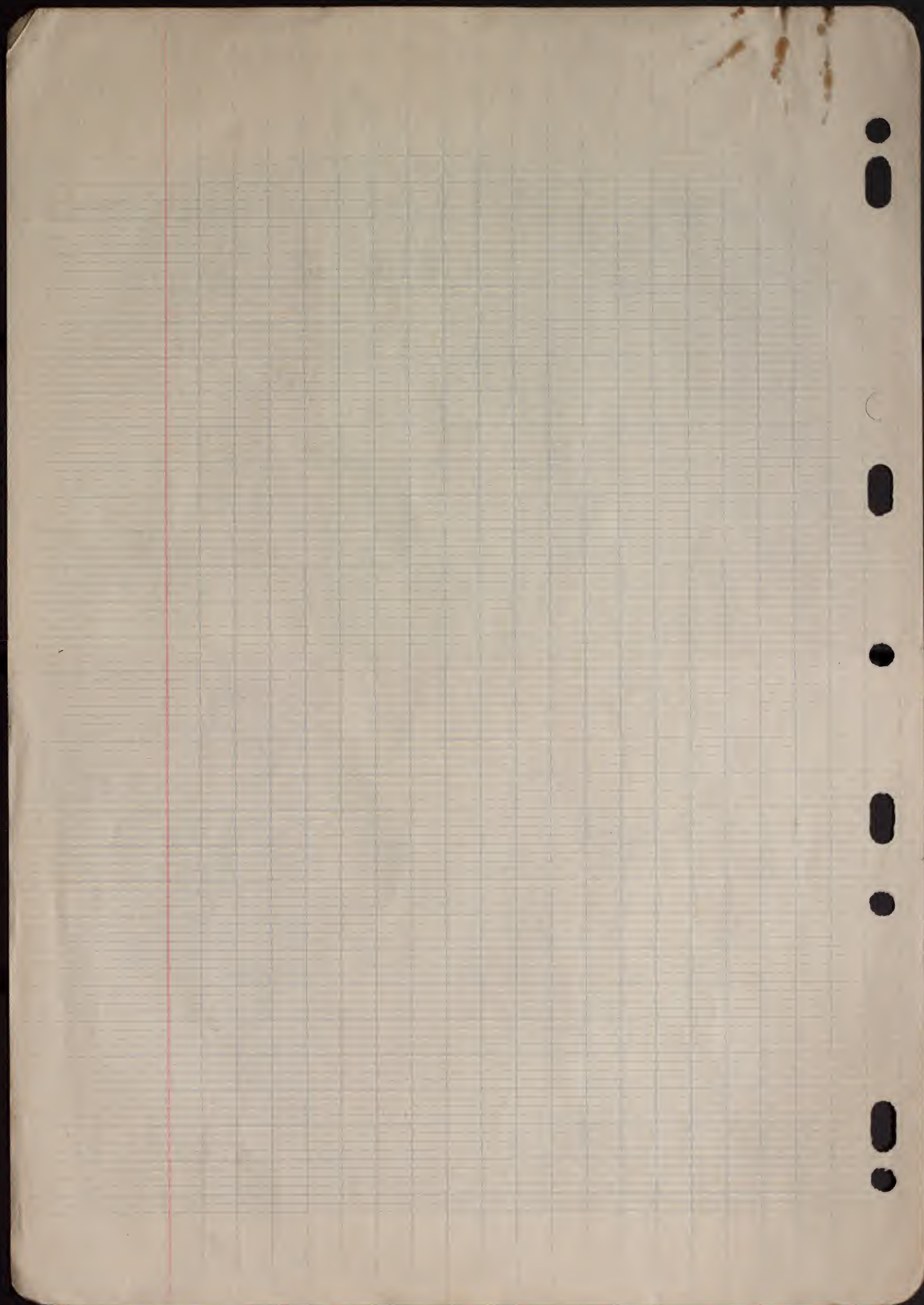
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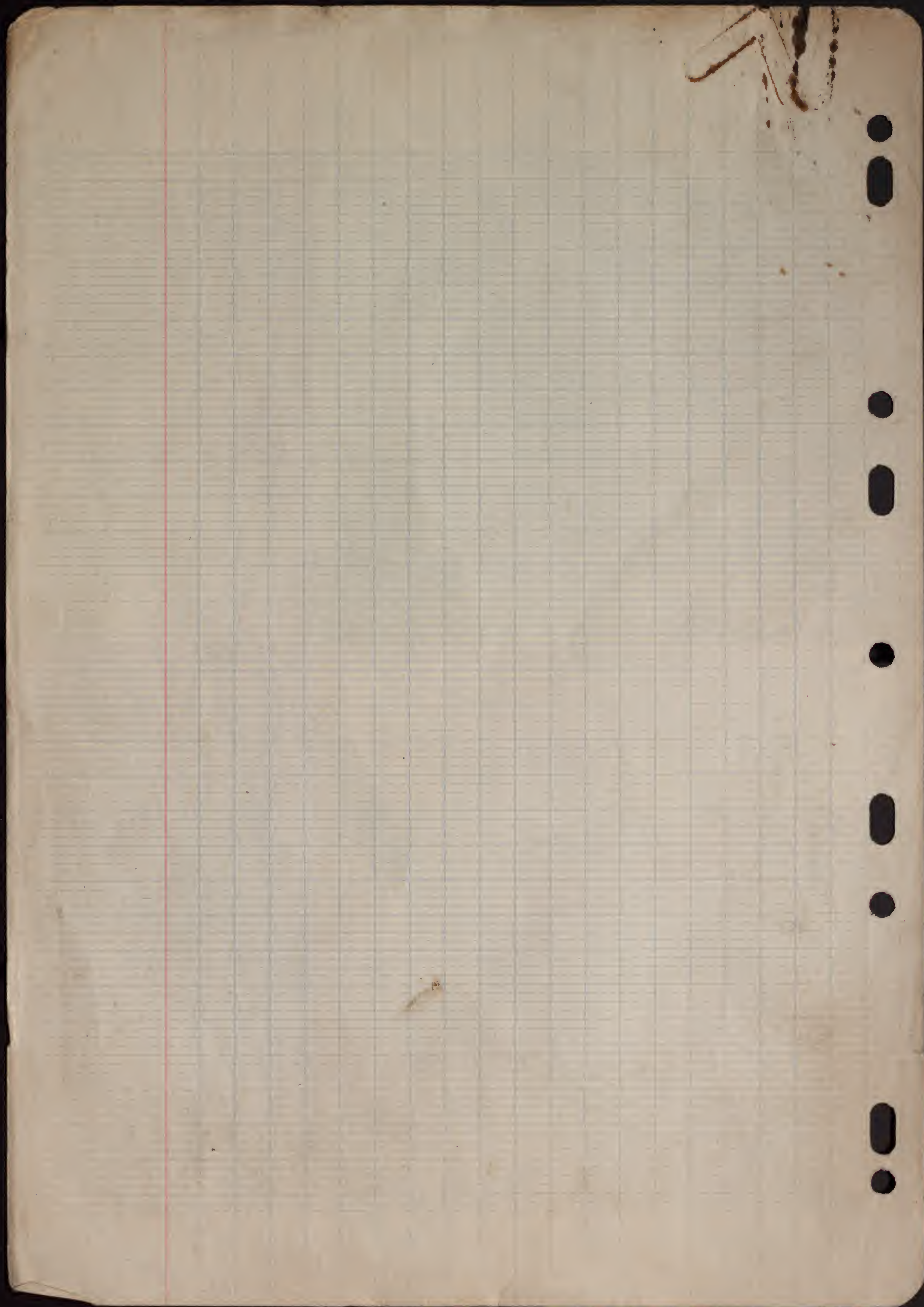
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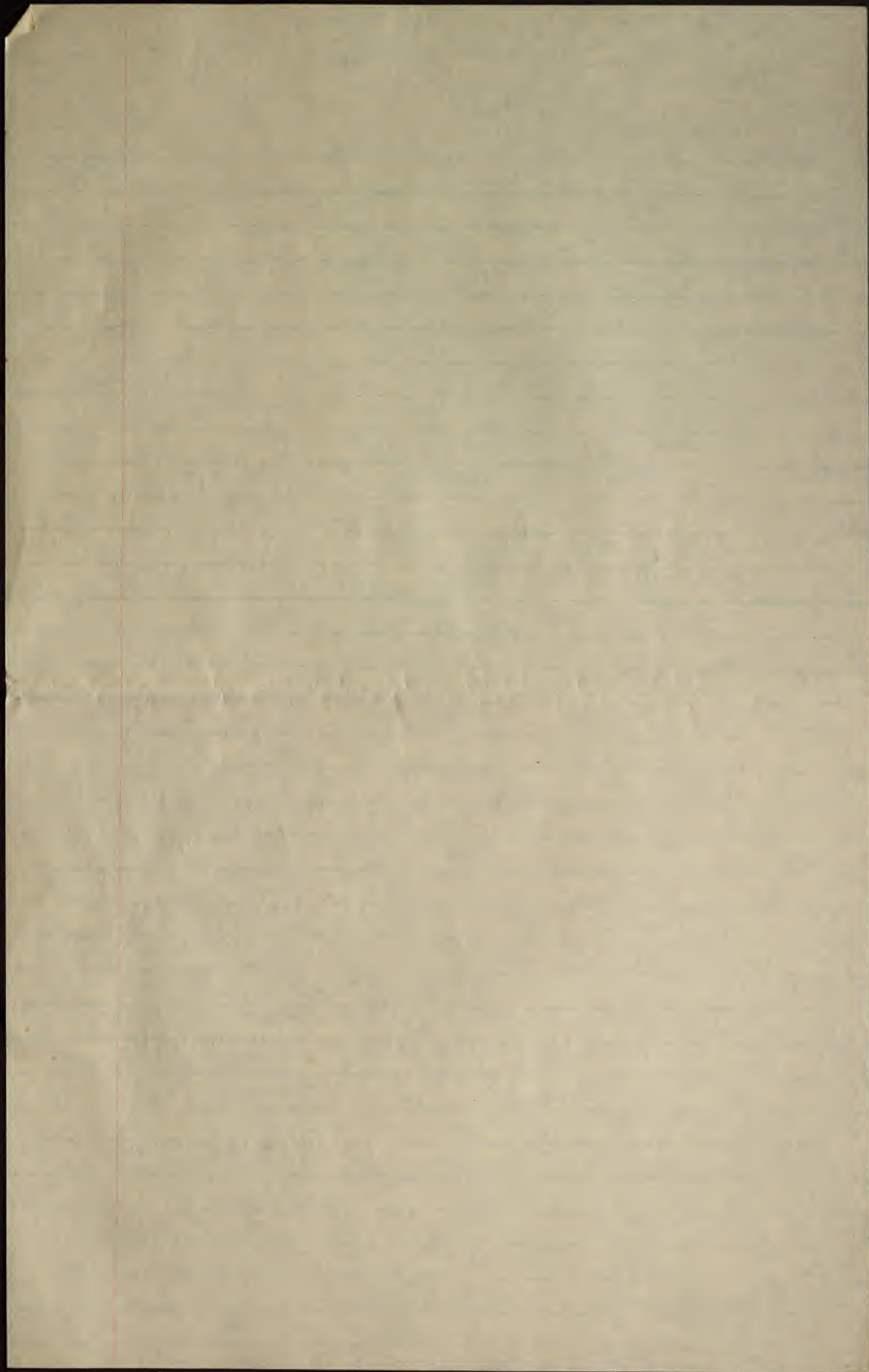
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The BB Roller has many visual as well as vocal signals

Any intention movement or slight movement forward or back must encode information. The information probably is ^{intended} decided by many ~~circumstances~~ ^{circumstances}. Such patterns do not necessarily become exaggerated in form or frequency, especially to convey information; they also have "practical" functions to serve. Still, there can be selection pressure for exaggeration and stereotyping, i.e. "ritualization" in many circumstances. BB Rollers are distinctive among coraciiforms in having evolved a comparatively large number of ritualized postures and movements, ^{during the display performed by birds} Among them are Upright Postures, Fluffing of the neck feathers, Head-flapping, Tilting, ^{raising} Raising of the carpal joints, ^{spreading} Spreading of the tail feathers, a Bow or Low Oblique posture, a Looking Down posture, and possibly displacement preening and bill-wiping. Aerial displays are described below.

^{Assuming} In an U.p., a bird simply stands erect, the neck stretched directly upward or upward and slightly backward, ~~with~~ the head and bill horizontal ~~and~~ or pointed slightly downward. See Fig(s) —

may either look away from one another or tilt their heads away from one another while continuing to look forward. Figs. —

Long tailed gony et

Purple

Redbill \longleftrightarrow Blackbill \longleftrightarrow Yellowbill

Broadbill \longleftrightarrow Blue-belly \longleftrightarrow Abyssinian

Mal \longleftrightarrow Senegal \longleftrightarrow Strick Grayhead

Pied \longleftrightarrow Giant

Alcedo, Ceryle, etc.

Three different Linnaeus.

Description birds. Sexual dimorphism

Herbert. Cap Vert. M. Brown, other parts Petite Cote

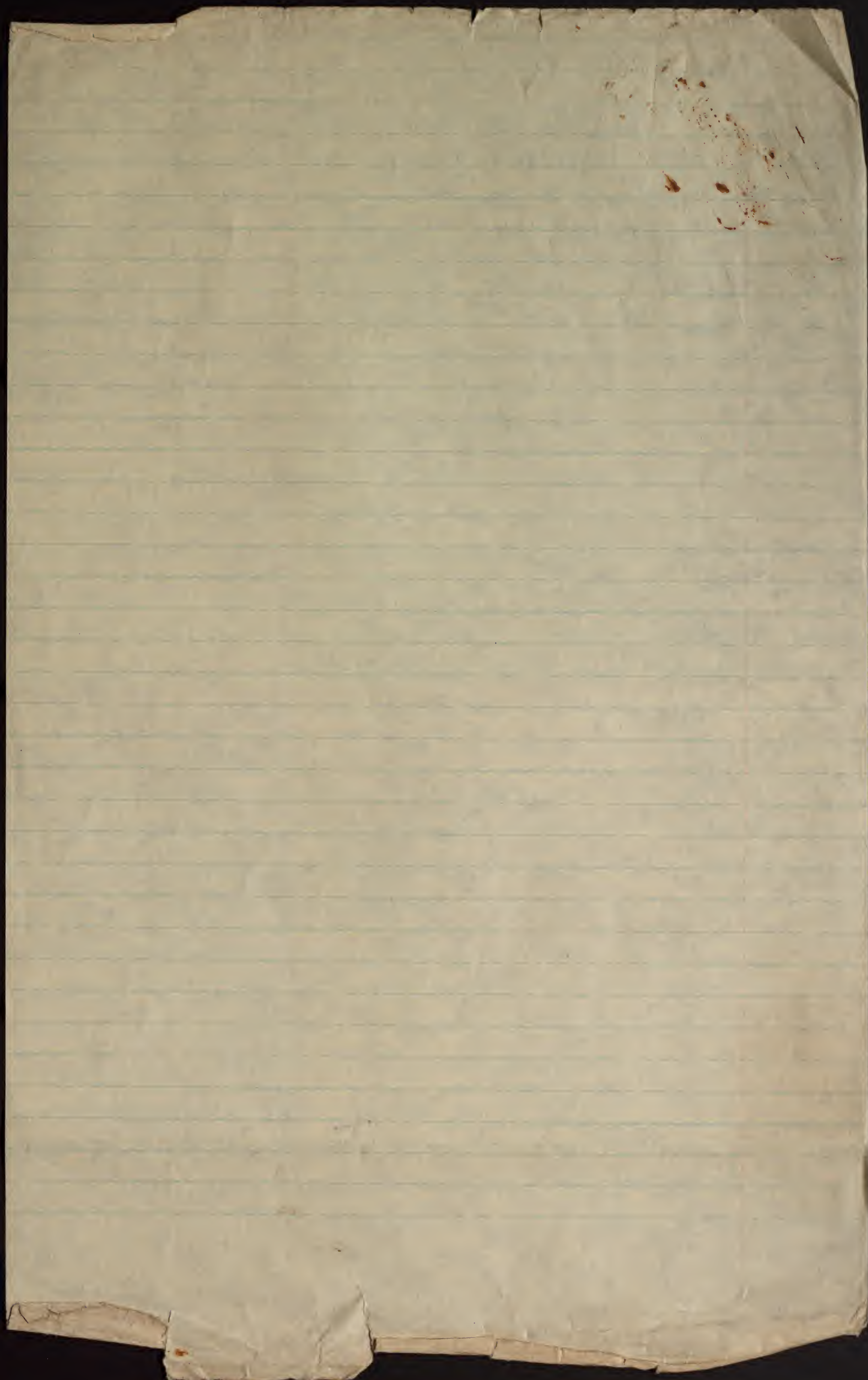
Staging birds.

Interspecific social arrangements.

Capulation

Nest-building

Interspecific relations



glover calls this "Javan Kingfisher"

(t)

HALCYON CYANOVENTRIS - Summary Index - March 1, 1979. pp. 132-130

Only seen briefly Feb. 24-Mar. 1. Near villages of Pedak and Gentan, off road from Yogya to Kaliurang (Mt. Merapi)

Population very small. Probably only 3 individuals. 1 ♂ and 1 ♀ forming a pair. Plus 1 "intruder" (probably another ♂). Just possibly 1 or 2 more individuals 1/4 - 1/2 mile away.

All observations made in or near territory of local pair. Actual dimensions of territory not estimated. Possibly quite large. ^{But see below} Apparently most favored area is stretch of presumably artificial "gallery forest" along small stream (and fish ponds) of fairly clear water. "Forest" composed of bamboo, coconut palms, breadfruit, occasional bananas and ferns, and quite a variety of (other) dicots. Looking rather damp and lush as a whole. References 132, 136, 140, 142.

The birds spent a lot of time perched high in semi-bare leguminous trees (136 and many other refs.). Lookout post and display site. But the birds fed, and perhaps did many other things, lower down inside forest.

Foods seen to be taken included a small snake or eel (139) and something more globular, perhaps a frog (148).

Such as they are, the data suggest that this species may prefer closed or semi-closed habitats. Rather different from the myrmensis that I have seen elsewhere. Quite different from both myrmensis and the local chloris in not perching on high wires. (There were no wires at this precise site, but there certainly were some not far away. But these wires were the province of chloris, Blue-tailed Bee-eaters, wood-swallows, etc.)

If this species really is basically forest-inhabiting, it is remarkable that it has no white underneath. This might suggest that most of its social life is conducted on top or at the sides of the forest (138).

Relatively late (1/2 hr after sunset) arrival at display perch. All days

General discussion of the Kingfishers of Sumatra and Java (and perhaps
other of the Greater Sunda Islands). There seem to be no open-country, maritime
chameaus (142). Presumably this reflects earlier conditions of nearly continuous
forest. Obviously the local species have not changed their habits pari passu
with their changing habitats.

Be that as it may, the local cyanoventrus don't have to worry about
contacts with individuals of many other species. They were never seen to come
into even long distance contact (within earshot or eyesight) of any other
Coraciiformes. They may, however, be discouraged by Drongos (147). Probably
usual ignore the local squirrel, Callosciurus sp. (142). But I did see one bird
fly to a squirrel, uttering "Chak" Notes, on one occasion (148).

The local pair of cyanoventrus certainly were in breeding condition dur-
ing the period of my observations. I saw the presumed ♂ feed the presumed ♀
once (139). I also saw one copulation (143 et seq.). General comment on
rarity of copulations in Halcyon spp. (144).

It is interesting that the ♂ and ♀ had little or nothing in the way of
regular greeting (137, 139, 144). They were not, in fact, very "close" to one
another except during sex. In this respect they seemed to be quite typical of
Halcyon (144).

They may have been very atypical in another respect. "Songs" (Rattles
while alone) may have been uttered only by the ♂ (147). The presumed ♀ was usually
or always silent while alone (138, 140, 142, 148).

I saw a variety of hostile behavior patterns. At least 3 good hostile
encounters between pair and intruder (136, 137, 138, 145, 149). No actual
physical contact between opponents (149). This is, of course, typical of Halcyon.
More remarkably, the disputes were largely or completely silent (145, 149).

Dispute with "Flight Display" and short series (137). With 4th HF,

In this place, was looking?
Perhaps the first that I could see not feel together

Halcyon cyanoventrus (Cont'd)

(2)

BW, Wingspreads, Wingdroop, Tailspread (145). With St, U, BD-PAG, BW, Wingspread, CO, Tailspread, Tailraise (149)

"Flight Display" of the species seems to be more variable, less ritualized, than that of swainsonii. Only seen twice. Once with Monosyllabic "Tseep" Notes and Short Series during dispute (137). The other time with "Tseep" Notes, Short Series, and longer Rattles by single bird, presumably ♂, alone (147).

Vocal repertoire is comparatively simple. Or at least clear (easy to understand). Two basic components: "Chak" Notes and all the rest (ranging from single "Tseep"s to long Rattles). Is this dichotomy strictly homologous with Yelp-Rattle split of Megascops maxima? Or is it partly convergent or parallel?

① "Chak" Notes. Obviously homologous with the various "laughing", "raucous", "harsh", "staccato", calls of other Halcyon spp. Also the so-called "chatter"s of H. senegalensis. (But I have used the term in several different senses in accounts of different species at different times. The "Chak"s of cyanoventrus are not quite the same as the "real" Chatters of rollers. See comment p. 138.)

General sound can be very much like swainsonii (140). But also, perhaps, less harsh or sharp on other occasions (133, 137)

Long series "Ka" or "Kaa" type (like Cuckoo or woodpecker?), (133)

In flight (136, 137) Beginning Flight Display (137) By individual coming in to land alone. With escape from Pond Heron (140). As reaction to pot. pred. (143). As reaction to squirrel (148). By ♀ flying away after copulation (144).

Presumably "Chak" Notes contain an appreciable escape component

② Monosyllabic "Tseep" Notes Perhaps (not certainly) the "Basic Note". Certainly one extreme (lowest intensity?) of continuum which passes through Short Series to long ("full") Rattles. Each "Tseep" sounds like a single component of a Rattle. By perched bird, with Short Series and Rattles (139, 147).

During hostile Flight Display, with Short Series and Rattles (137). With solitary

(w)

Flight Display (147)

(3) Short series 2 (= Doublet?) to perhaps 8 (abbreviated?) "Tseep" Notes (137, 147) Sometimes tending to fall into Quadruplets, as in myiarchus is (139). Sometimes not (148). Presumably lower intensity than longer Rattles (139). With single "Tseep" Notes and longer Rattles; by bird perched alone (139, 147). With Flight Display (137).

(4) Rattles Long series Generally very myiarchus-like. Probably often identical. But sometimes less loud or metallic (137, 139, 149). Sometimes with Intro (137). Sometimes without Intro (147). By bird perched alone (139, 147). Often associated with Short Series (139, 147). Brief styled version during dispute (149). Presumably functions as song. (139, 147, 148)

Visual repertoire includes many more components. Some highly ritualized. Others apparently unritualized.

The species certainly uses V during disputes (149 and several earlier references). Also HF (Once with Tailspread - 145). And BD-PAG. And BW. All this is quite reminiscent of Coracias cyanogaster. (And functionally related to belly color???)

Some BW, especially after feeding, may be quite autochthonous (142, 144). Other performances may be allochthonous. During dispute (149). With Tailspread and HF during dispute (145).

The species also seems to have an ft. Not very exaggerated in form. Sometimes with Wingspread (138, 149). Perhaps more often (?) without (136). By bird landing alone (139). By bird landing in same tree as partner (143). During hostile encounter (145).

As usual, Wingspreading is conspicuous. It is obviously hostile in this species. With ft (138, 145, 149), or without ft (136, 145, 149). Usually with V (149). With BD-PAG, Tailspread, and Tailraise (149).

Halcyon cyanoventris (Cont'd 2)

(X)

The species also has Wingdroop. By intruder. With Tailspread (143 and sketch). With V (149).

And a chloris-like CO. During dispute (149).

The species certainly has exaggerated Tail-wagging. Seen to be performed only by ♂ immediately before mounting and copulation (143). General comment and comparison with chloris (144).

I did not notice any less elaborate V-D TF's of a more conventional kind.

Two other tail patterns must be significant in their own ways.

There is a definite Tailraise. Seen with Tailspread, Wingspread, etc. (147).

There is also a Tailspread. By intruder, with Wingdroop, without Tailraise (145 and sketch). During dispute, with Tailraise, Wingspread, etc. (149).

Wingspread, Wingdroop, CO, Tailspread, and Tailraise would all seem to be closely related to one another (149). All derived from locomotion (flying?) intention movements.

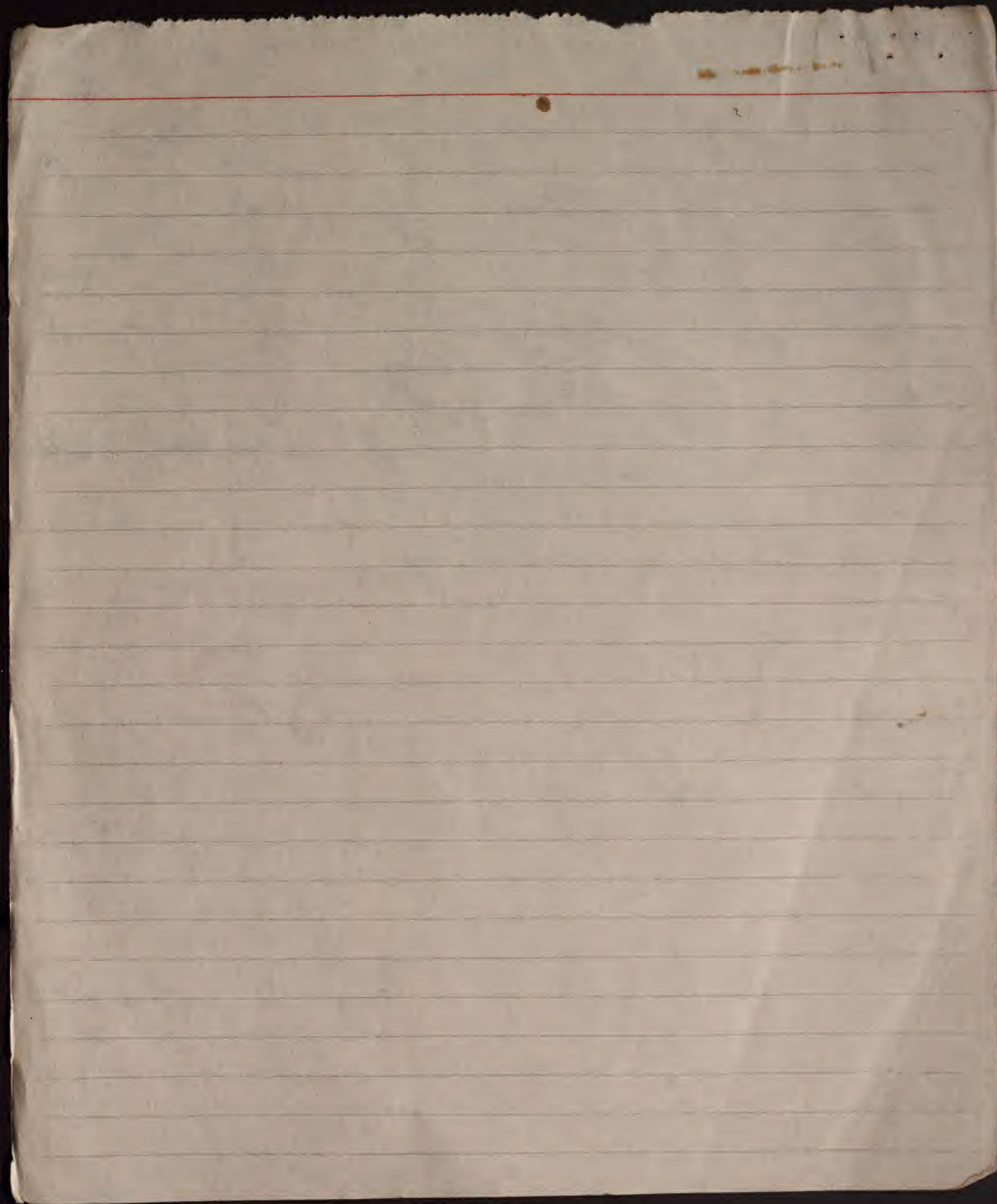
It is my impression that this species is less frequently vocal than myzocnemis. On the other hand, it has a lot of visual signals. What does this suggest? Are males and females usually close together? Are they usually in sight of one another? Are pairs scattered? Are territories small? (And separated from one another by intervening "unoccupied" spaces?)

The inds. of cyanoventris performed a few WF's. There appeared to be unritualized. Or at least not "social" (143, 147).

I did not see any HB's by these birds (143).

H. cyanoventris is obviously related to myzocnemis. H. pileata may be member of same species group. See p. 150. Group as a whole may be related to chloris (and sancta and the Palau species, etc.) All oriental and more or less "capped", with some similar displays. See p. 146.

Perhaps sight factor is most important.



General Comments Could sexual dichotomy of culture or sequence of behavior, be an adaptation to facilitate a association between individuals (especially feeding together)?

Feeding Shallow-dives of wasps

Feeding small fishes, 73

Never without vocs

V-D TF's With Doublets, '73, '74, '76

Purely of pattern? I.E. Doublets with TF's vs Doublets without TF's?, '76
With Tailspread, '76

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Provoling Doublets as answer, 75

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No TF's during Doublet phase, 73, 76

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Usually solitary. Possible "pair" ?; 69

Jan 20 -

Thurs 78

Pileata Usually silent.

V-DTF's after extracting before crow; 72

V-DTF after dispute with Chlor; 73

HB; 68, 69

Pays no attention to Redwings or Bee-eaters

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In second growth; 71

Edge mangrove; 69, 70,

"Kaa" Notes; 68(?)

Rattle ????; 68

Habitat between Chlor and White-throat; 71

Dispute with Chlor; 68?, 75

Chlor

Associated with mangrove at K.S.; 68 et seq

On Delaunoy Hill, in Frangipani; 69,

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- 2.5. The Yellow-bill
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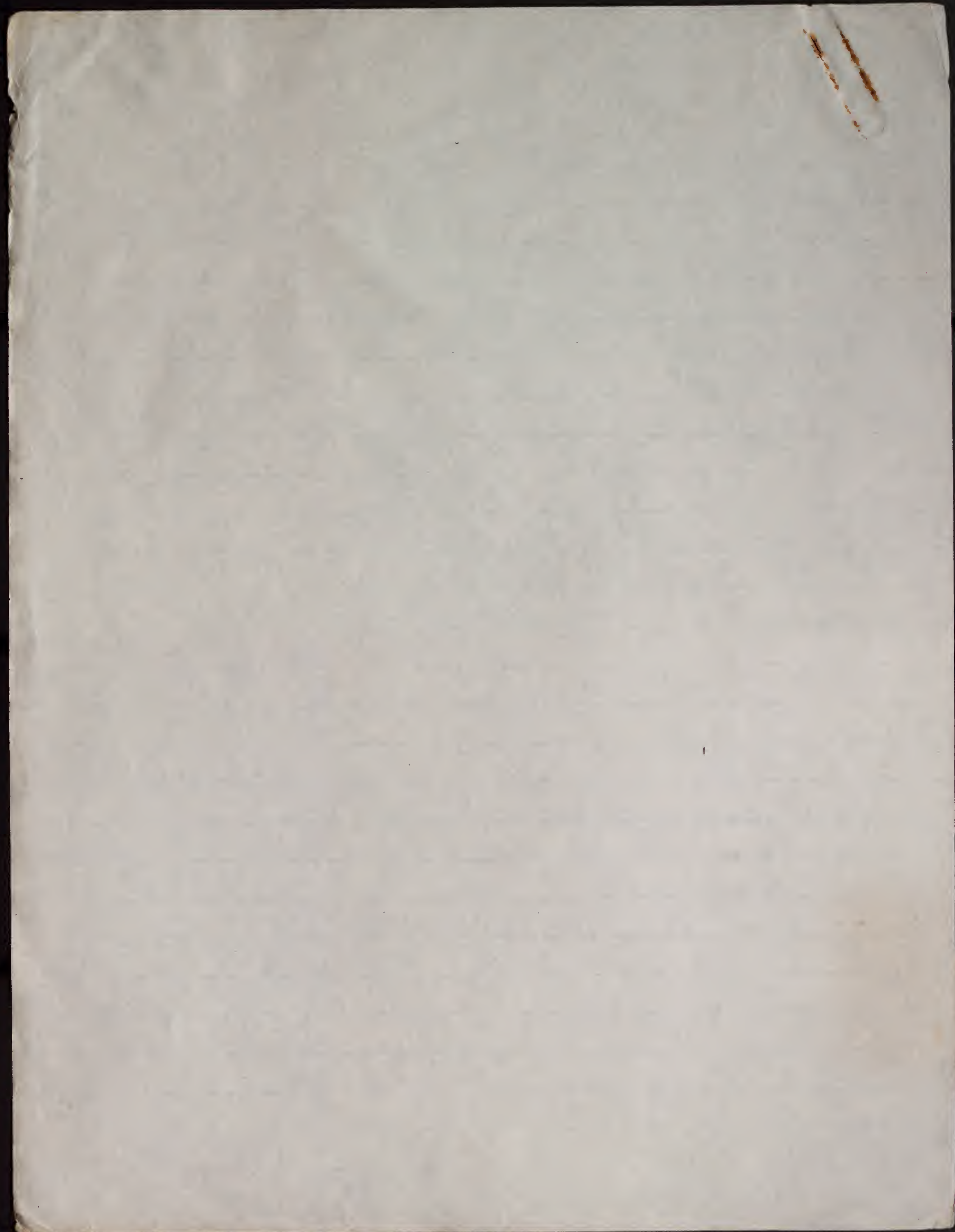
3. - Discussion

Elaeo guineensis

Borassus sp

Adansonia digitata

Cerbera pentandra (Forster)



1976

August 14-16. Cap Vert.

August 18-20. M Bour and environs

August 21 - Sept. 1. Cap Vert

Sept. 3 - 22. Ziguinchor

Sept. 23 - 28. Cap Skirring

Sept. 29 - Oct. 6. Ziguinchor

Oct. 7 - Oct. 16. Cap Skirring

Oct. 17. Ziguinchor

Oct. 19 - 21. M. Bour

Oct. 22. Cap Vert.

Oct. 25 - Nov. 2. Ziguinchor

Nov. 3 - Dec. 2. Ossonge

Dec. 4 - 5. Katinong

Dec. 6 - 7. Ziguinchor.

Dec. 17 - 28. Makskou.

Lower Casamance

Ziguinchor?

Cap Skirring?

Samatit?

Katinong?

Upper Bayla Marigot

Bignona Marigot.

1977

Jan. 1 - 2. Abidjan.

Jan. 3. Roberts Field

Jan. 5 - 17. Nembra (Grassfield)

Jan. 22 - Feb. 26. M. Bour

Feb. 28 - Mar. 7. Ziguinchor

Mar. 8 - 10. Samatit

Mar. 11 - 18. Cap Skirring.

1981

Jun. 15-21. Zuguncho.

2.1. Schedules, sites and habitats.

My observations were made in West Africa, mostly in the Republic of Senegal, during one long visit in 1976-1977. The visit was interrupted by a brief excursion to Gambia, the Côte d'Ivoire, and Liberia. It was supplemented by a ^{very brief and partial} visit later, in 1981. The itinerary was as follows (all areas are in Senegal unless stated otherwise):

1976.

August 14-16. Cap Vert (~~Dakar and surroundings~~).

Aug. 18-20. The Petite Côte (~~essentially M. Bour~~).

August 21 - Sept. 1 Cap Vert.

Sept.

Cap Vert. Districts of Dakar. Near village of Yennineul near Rufisque.

Petite Côte. South of Dakar. Near town of M. Bour.

Lower Casamance. South bank. Near vicinity of Ziguinchor. Dyebebe
Minguis. Parc National de la Basse Casamance. Samatit. Cap Skirring. Amin

Lower Casamance. North bank. Salween ^{Brannon} Katurong. Road between.

